UPPER COLORADO
2001 WATER YEAR IN REVIEW

A LOOK BACK AT LAST YEAR....

This is a summary of the 2001 Upper Colorado River Basin water supply forecasts and subsequent observed runoff volumes where available. Volume forecasts and observations are for the April-July period (except where indicated) and are expressed in 1000's of acre-feet. Averages used are for the 1971-2000 period.

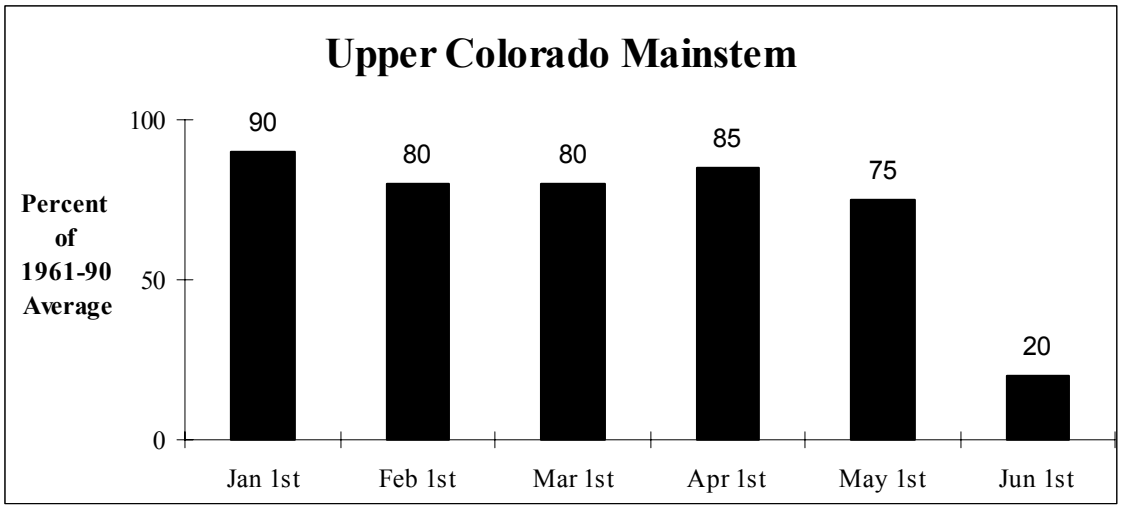
This product is designed to assist individuals and agencies with water supply concerns in summarizing last year's (2001) spring runoff and in planning for the coming year.

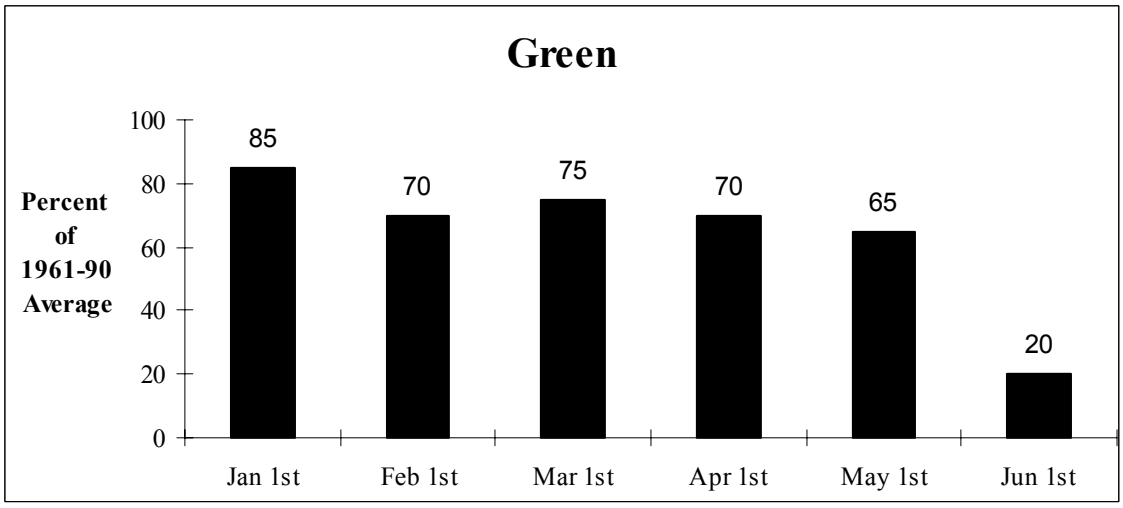
Please note that all observed values are provisional. Final values may differ from those listed herein. Many adjustments for diversions have been estimated from historical averages. In extreme years these *average* estimates may result in large discrepancies between provisional and final values. In addition, during hot, dry summers both unknown/unmeasured diversions and environmental losses due to evaporation and channel transmission tend to increase. Total abstractions, engineered and environmentally induced, may cause natural flow calculations to yield a number less than zero, particularly at locations well downstream. At such locations, comparisons between forecast and observed flows become more difficult and less meaningful.

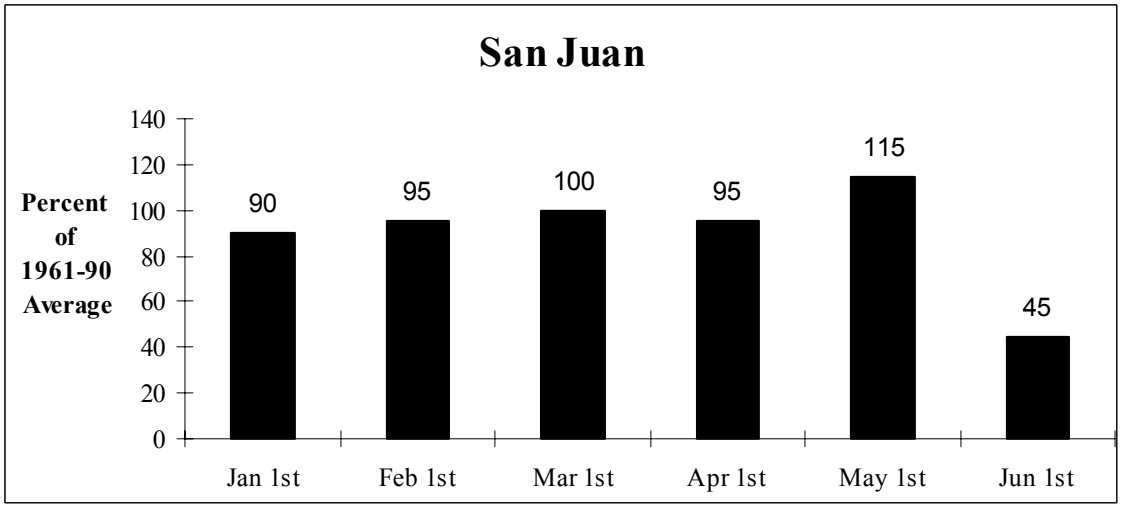
Included in this review is expanded treatment of the confidence intervals associated with forecasts. The reasonable maximum and minimum values, which form the boundaries of the confidence interval, are statistical measures reflecting both the accuracy of the regressions equation used to produce the forecast and the natural variability of streamflow volume. As the forecast season progresses, confidence intervals should narrow as meteorological conditions become known. The most probable forecast, a 50% exceedance probability, is most often cited. However, the reasonable minimum, a 90% exceedance probability, and maximum, a 10% exceedance probability, are important indicators of the "confidence" of the most probable forecast. Under normal meteorological circumstances, observed flows will fall within the confidence interval 80% of the time; flows may occur outside interval boundaries in years exhibiting uncharacteristic conditions.

SPRING 2001 SNOWPACK REVIEW

Snow Water Equivalent







2001 Forecast Summary for: UPPER COLORADO MAINSTEM

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	%AVG
COLORADO	LAKE GRANBY, GRANBY, NR	215	200	185	175	170	160	155	69
	HOT SULPHUR SPRINGS	385	350	350	320	320	280	N/A	N/A
	DOTSERO, NR	1350	1210	1150	1150	1150	1120	952	66
	GLENWOOD SPRINGS, BLO	2020	1800	1700	1700	1630	1640	1440	67
	CAMEO, NR	2180	1940	1800	1800	1740	1700	1590	66
	CISCO, NR	3900	3400	3200	3200	3000	2800	N/A	N/A
WILLOW CK	WILLOW CK RES, GRANBY, NR	50	45	43	41	39	33	6.4	13
FRASER	WINTER PARK, NR, UPR, STATION	N/A	N/A	N/A	N/A	N/A	N/A	12.9	64
WILLIAMS FORK	WILLIAMS FORK RES, PARSHALL, NR	N/A	N/A	N/A	N/A	N/A	N/A	72	84
EF TROUBLESOME CK	TROUBLESOME, NR	90	82	82	82	85	81	76	80
BLUE	DILLON RES	18.5	16.5	15.7	14.7	13.8	10.9	N/A	N/A
	GREEN MTN RES	150	130	130	150	150	150	144	86
EAGLE	GYPSUM, BLO	250	230	230	255	255	250	226	81
FRYING PAN	RUEDI RES, BASALT, NR	300	255	245	245	220	240	241	72
ROARING FORK	GLENWOOD SPRINGS	125	105	105	105	97	97	102	72
PLATEAU CK	CAMEO, NR	600	525	500	500	440	470	478	67
TAYLOR	TAYLOR PARK RES	80	60	55	52	52	45	47	41
	ALMONT	85	69	69	73	70	65	69	66
EAST	ALMONT	135	110	110	110	110	100	101	61
GUNNISON	GUNNISON, NR	150	135	130	130	130	125	127	66
	GRAND JUNCTION, NR	310	260	250	250	250	240	247	63
MUDDY CK	PAONIA RES, BARDINE, NR	1300	1000	1000	1000	950	860	953	61
NF GUNNISON	SOMERSET NE	82	68	65	63	52	48	42	41
SURFACE CK	CEDAREDGE	225	190	190	180	180	150	160	52
UNCOMPAHGRE	RIDGWAY RES	12	9.8	9.8	9	9	9	8.5	50
	COLONA	95	90	87	80	80	80	80	77
	DELTA	125	115	110	100	100	100	100	72
DOLORES	DOLORES	105	100	93	85	83	83	70	60
	MCPHEE RES	250	240	240	220	200	190	193	73
	CISCO, NR	290	275	280	255	235	220	209	65
SAN MIGUEL	PLACERVILLE,NR	520	490	480	420	350	340	234	42
	NATURITA	120	120	110	105	100	100	114	86
MILL CK	MOAB, NR, SHELEY TUN, AT	165	165	150	130	125	125	N/A	N/A
INDIAN CK	MONTICELLO, NR, BOGUS POCKET ◆	4.5	3.5	4.3	4.3	4	4	3.7	74

◆ March-July Forecast Period

Provisional Flows in 1000 Acre - Feet

2001 Forecast Summary for: GREEN RIVER BASIN

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	%AVG
GREEN	DANIEL, NR, WARREN BRIDGE, AT	225	205	180	165	175	155	137	52
	GREEN RIVER, WY, NR	765	630	530	460	460	335	271	31
	GREEN RIVER, UT	2800	2300	2160	1900	1810	1680	1760	56
PINE CK	FREMONT LK, ABV	102	88	80	80	80	65	N/A	N/A
NEW FORK	BIG PINEY, NR	365	310	260	240	240	225	170	43
BIG SANDY	FARSON, NR	53	45	42	35	38	32	28	48
BLACKS FK	MILLBURNE, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EF SMITHS FORK	ROBERTSON, NR	30	24	22	22	20	19	26	84
HAMS FORK	FRONTIER, NR, POLE CK, BLO	N/A	N/A	N/A	N/A	N/A	N/A	103	147
	VIVA NAUGHTON RES	80	48	43	33	33	30	N/A	N/A
YAMPA	STAGECOACH RES, BLO	32	28	26	26	28	28	N/A	N/A
	STEAMBOAT SPRINGS	285	225	225	220	200	200	191	68
	MAYBELL, NR	900	740	740	700	670	645	588	59
ELKHEAD CK	ELKHEAD, NR	40	27	28	26	20	20	N/A	N/A
FORTIFICATION CK	FORTIFICATION, NR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LITTLE SNAKE	SLATER, NR	135	112	117	100	100	100	81	51
	DIXON, NR	280	240	240	210	210	210	N/A	N/A
	LILY, NR	310	255	255	220	220	220	206	56
BIG BRUSH CK	VERNAL, NR RED FLEET RES, ABV	16	15.8	18	15.5	17	19	24	114
ASHLEY CK	VERNAL, NR	47	45	52	50	55	55	60	115
WF DUCHESNE	HANNA, NR	20	16.9	16	14	11	11	31	129
ROCK CK	UPPER STILL WATER RES	73	73	73	67	71	71	N/A	N/A
	MTN HOME, NR	86	86	82	77	83	83	71	80
DUCHESNE	TABIONA, NR	88	78	77	65	60	60	80	76
	DUCHESNE, NR, KNIGHT DIV, ABV	165	159	151	137	140	140	N/A	N/A
	MYTON	245	192	185	150	150	150	197	76
	RANDLETT, NR	305	240	240	185	185	190	247	76

Provisional Flows in 1000 Acre-Feet

2000 Forecast Summary for: GREEN RIVER BASIN

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	%AVG
STRAWBERRY	SOLDIER SPRINGS, NR	44	34	34	21	15	15	44	75
	DUCHESNE, NR	94	75	73	45	36	36	84	69
CURRANT CK	CURRANT CK RES	16	14.1	14.1	9.5	8.4	8.4	N/A	N/A
LAKE FORK	MOON LK RES, MTN HOME, NR	67	62	62	56	62	66	77	113
YELLOWSTONE	ALTONAH, NR	63	60	62	55	59	59	67	108
WHITEROCKS	WHITEROCK, NR	55	54	63	50	52	55	61	109
WHITE	MEEKER, NR	260	220	220	195	190	185	230	79
	WATSON, NR	270	230	230	205	215	195	209	69
GOOSEBERRY CK	SCOFIELD, NR	9.5	8.8	7.6	6.1	6.1	6.1	N/A	N/A
PRICE	SCOFIELD RES, SCOFIELD, NR	35	32	29	23	23	23	21	46
WHITE	BLO TABBYUNE CK, SOLDIER SUMMIT	15	10.3	12.1	9	6.5	6.5	N/A	N/A
HUNTINGTON CK	ELECTRIC LAKE	10.5	8.5	8.5	7.3	6.5	6.5	N/A	N/A
	HUNTINGTON, NR	31	25	25	20	18.5	18.5	42	84
SEELEY CK	JOES VALLEY RES, ORANGEVILLE, NR	40	38	40	33	31	27	39	67
FERRON CK	FERRON, NR	29	28	30	24	23	23	33	85
SEVEN MILE CK	FISH LAKE, NR	5.5	5.5	5.5	5	4.4	4.4	N/A	N/A
MUDDY CK	EMERY, NR	15.1	15.1	15.7	11	11	11	16.5	83

Provisional Flows in 1000 Acre-Feet

2000 Forecast Summary for: SAN JUAN BASIN

April-July volumes unless otherwise noted

STREAM	STATION	JAN	FEB	MAR	APR	MAY	JUN	OBS	%AVG
SAN JUAN	PAGOSA SPRINGS	200	210	235	220	250	230	239	106
	CARRACAS, NR	375	385	410	390	445	390	N/A	N/A
	FARMINGTON	1190	1170	1250	1200	1300	1280	N/A	N/A
	BLUFF, NR	1150	1220	1290	1250	1330	1330	1070	87
RIO BLANCO	PAGOSA SPRINGS, NR, BLANCO DAM	55	54	55	51	59	57	N/A	N/A
NAVAJO	CHROMO, NR, OSO DIV DAM, BLO	65	65	65	63	71	68	N/A	N/A
PIEDRA	ARBOLES, NR	210	220	250	245	265	260	235	102
LOS PINOS	VALLECITO RES, BAYFIELD, NR	190	215	235	225	240	245	232	113
ANIMAS	DURANGO	425	430	420	380	385	450	421	96
FLORIDA	LEMON RES, DURANGO, NR	58	60	65	62	62	68	N/A	N/A
LA PLATA	HESPERUS	30	27	25	25	22	21	23	92
MONTEZUMA CK	MONTICELLO, GOLF COURSE, AT ◆	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RECAPTURE CK	BLANDING, NR, JOHNSON CK, BLO ◆	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

◆ March-July Forecast Period

Provisional Flows in 1000 Acre - Feet

What makes a **GOOD** water supply forecast?... a **BAD** forecast?

Is it as simple as which forecast comes closest to the actual observation? Probably not, as a number of factors necessitate a more sophisticated evaluation of forecast quality be undertaken. Such an evaluation would not be trivial and is beyond the time and space constraints of this note. Nonetheless, with apologies for simplification and omission, some of the factors include:

subsequent meteorologic conditions - the implicit assumption behind any forecast is that the meteorologic conditions during the remainder of the snow accumulation and melt season will be "normal." While it may be difficult to adequately define what "normal" is, it is easier to discern conditions that are extreme or "not normal." As such, a given forecast at a given time may have been the best forecast possible in light of known conditions, although ultimately turning out to be 20% too low; it just so happened that the ensuing meteorologic conditions were unusually wet. Just as a good forecast may be made to look bad by abnormal conditions in the future, the reverse situation is also possible.

natural variability of site's streamflow - simply put, some rivers are much more difficult to forecast then others. Historically, such river flows may vary over a wide range and be quite sensitive to changing conditions, particularly in environs where the number of precipitation events are few. On the other hand, some river flows may be relatively constant with the effects of diverse conditions dampened. Oftentimes scale is a good indicator of the variability of flow at a given site. A 20% error on a small stream in Arizona may be more laudable than a 10% error on Lake Powell inflow.

character of the year - by definition, extreme events are rare and forecasting such events become more difficult. Because the number of past extreme events is small, less is known about the distribution and variability than in situations with "near-normal" populations. Even if it was possible to remove uncertainty about future meteorological conditions, there would still be more error associated with forecasting extreme events.

During the extreme conditions there is a demand that the forecaster make a more powerful (and potentially more valuable) statement: in effect, that "even normal conditions from here on out will not be enough to compensate for current abnormal snowpack and soil states." It is during such events that consideration of information other than just the most probable forecast become especially important. Probability statements that convey the likelihood of exceeding a certain level (such as the reasonable maximum and minimum forecasts) help to underscore the uncertainty associated with the forecast.

So why do it? although it may not be a simple matter to grade a forecast, it is still useful for users and forecasters alike to review the previous year's forecasts and adjusted observations (provisional as they may be with estimated diversions) so as to act on obvious problems and to gain perspective for the coming forecast season.

Additional Information

Water supply forecasts take into consideration present hydrometeorological conditions and use average basin temperatures and precipitation for the forecast period. As the forecast season progresses, a greater portion of the future hydrologic and meteorological uncertainty becomes known and monthly forecasts become more accurate. Volume forecasts represent adjusted flows; that is, observed flows with upstream water use taken into account. At best, adjusted flows will closely approximate natural or unimpaired flows.
However, not all upstream diversions or impoundments are measured, quantifiable or predictable.

The Water Supply Outlook is issued monthly January through May by the Colorado Basin River Forecast Center, National Weather Service. It represents a coordinated effort between the National Weather Service, soil Conservation Service, Bureau of Reclamation, U.S. Geological Survey and local water district managers.

DEFINITIONS:
Acre-Foot:
The volume equal to one acre covered one foot deep (43,560 cubic feet).

Average:
The arithmetic mean. The sum of the values divided by the number of values.

Categories:

Much above Average	Above Average	Near Average	Below Average	Much below Average
Greater than 30%	111 - 130%	90 - 100%	70 - 89%	Less than 70%F

Forecast Period: The period from April 1 to July 31.

Most Probable Forecast:
Given the current hydrometeorological conditions to date, this is the best estimate of what the runoff volume will be this season.

Reasonable Maximum Forecast:
Given the current hydrometeorological conditions, the seasonal runoff that has a ten percent (10%) chance of being exceeded.

Reasonable Minimum Forecast:
Given the current hydrometeorological conditions, the seasonal runoff that has a ninety percent (90%) chance of being exceeded.

Water Year: The period from October 1 through September 30.
NOTE: Data used in this report are provisional and are subject to revision.
For more information, or to be included on the mailing list, please contact:
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